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ABSTRACT

Low reading achievement in the Chicago public schools spurred the development of a mastery approach reading package. This approach assumes that in time any student can achieve the level of the brightest student. Implementation of a mastery program in urban areas presents special problems, including diversity of student backgrounds, time and space limitations, and varying degrees of teacher expertise. The instructional materials of the Chicago mastery reading package consist of four elements: skills units, comprehension units, enrichment activities and basal readers. Teacher training, classroom management, and record keeping procedures were developed during the first year of program implementation. Although all data has not yet been collected, it has become increasingly apparent that reading instruction can be adapted to the mastery learning framework and utilized in a large city school system. (KS)

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PRACTICAL PROBLEMS OF ATTEMPTING TO IMPLEMENT A MASTERY LEARNING PROGRAM IN A LARGE CITY SCHOOL SYSTEM

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I. The Problem

One of the most persistent problems facing the Chicago school system is low reading achievement. The problem is pervasive; it affects nearly all areas of instruction and seems fairly resistent to a variety of remedies. The Department of Research and Evaluation has undertaken a project to see if the Mastery Learning approach of Benjamin S. Bloom (Bloom, 1968), which has proven successful in other subject areas, can be adapted to the unique problems of teaching reading in an urban setting.

II. Mastery Learning Theory and Strategy

Mastery Learning is based on the assumption that nearly all students can learn what only the best students presently learn. The philosophy of the Mastery Learning approach is (in part) that a subject consists of a body of knowledge and skills; the charge of the educational system should be to convey that body of knowledge and skills to all of the students (Bloom, 1968). The pedagogical basis of Mastery Learning is derived from the Carroll concept of aptitude: that it is reflective of how long it will take a student to learn, not how much he can learn (Carroll, 1963). From this view of aptitude, it follows that the majority of pupils, when provided with sufficient time and the appropriate feedback and corrective materials in relation to their efforts, can attain levels of achievement presently reserved for the brightest students.

The Mastery Learning teaching strategy begins with an analysis of the content of a course. The essential terms, facts,

concepts, etc. are gleaned from each unit in the curriculum (or chapter in the text) and a formative test is administered to all students. The students learn their weaknesses with respect to the unit and are provided with materials to remediate them. After working with remedial materials, the students who have not mastered a particular skill are retested to check for mastery. The formative test therefore, is used as a learning tool, not a ranking procedure. In a classroom setting, students who show no deficiencies in the initial testing either work as peer tutors for students who need help, or engage in enrichment activities during the remediation period.

Through this procedure, the weaknesses of students are identified and remediated before new material is introduced. Thus, when new material is approached, all students are ready to receive it. Since the progress that is made in the course is, by necessity, class progress, a spirit of cooperation among students is engendered.

To summarize, the procedure in the classroom runs something like this:

1. The entire class receives instruction on the unit.
2. The entire class takes a formative test on the unit.
3. The students are informed of their individual weaknesses with certain aspects of the unit.
4. The students receive alternative learning materials to remediate their individual weaknesses.
5. Students with weaknesses are re-tested.
6. When all students have reached an acceptable level of

mastery*, the process begins again at Step 1 with the next unit.

By spending the time to remediate deficiencies, Mastery Learning strategies often take more time to complete the first several units of a course. It has been found, however, that this time is made up in later units since more students are better prepared to approach new units (Block, 1970). It has also been found in several studies that student affect toward the subject increases as the student finds that he has more and more success with the subject (Bloom, 1973). A more detailed discussion of the theory and research related to Mastery Learning can be found in Block (1970) and a more elaborate description of operating procedures can be found in Block and Anderson (1975).

III. Nature of the Project

The goal of the project is to develop an effective Mastery Learning "package" for reading instruction in Chicago Schools. The package would contain all the materials necessary for implementation of a Mastery Learning strategy. These include:

A. Instructional materials — These consist of materials for initial instruction of units, formative tests and materials for remediation of deficiencies.

B. Materials to facilitate classroom management -- These include charts, graphs and instructions on organization

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* "Acceptable level of mastery" will operationalize differently in different settings. Block (1970) found that a range of 85% to 95% produced acceptable results.

necessary to manage the Mastery Learning strategy.

C. Teacher training -- This consists of written materials on the techniques of Mastery Learning as well as in-service training. There are aspects of Mastery Learning that are contradictory to traditional classroom teaching and need thorough explanation. (For example, the notion of "reviewing for the test" does not exist in Mastery Learning. The teacher gives the test and lets the results guide the review afterward.)

Development of the package presents some special problems in that certain constraints exist due to the realities of urban education. Among the particular problems that are faced in the development of the package are the following:

1. Pupils in urban areas represent dramatically different backgrounds; the package has to be flexible enough to accomodate this diversity.
2. The package has to be usable within the confines of the regular school day. To expect that the pupils who need extra time in order to reach mastery will take time out of the classroom is unreasonable.
3. In addition to remaining within the confines of the school with respect to time, similar constraints exist with respect to auxiliary aid to the classroom teacher. The package therefore needs to be developed such that it can be used by a single classroom teacher with up to 35 pupils.
4. Pupils in urban settings are very often pupils who are

behind grade level. This is not meant to be an indictment of urban school systems (and certainly not of urban pupils!), merely an acceptance of realities of the situation. A successful instructional technology must address this issue not only with respect to the cognitive aspects of the instruction, but the affective as well.

5. The teachers in any large school system vary greatly in expertise. The package has to be developed for the least well-trained, most inexperienced teacher as well as the experienced teacher.

With these problems in mind, the Project staff decided that in its initial year it would concentrate on one level of reading ability and address only the problems related to that level. To this end, five classrooms were selected with students who were at roughly the same achievement level (approximately 3rd grade equivalent in reading ability). All classrooms were provided with identical sets of materials. Participating teachers received training in Mastery Learning and were briefed on the objectives and materials in each unit before the unit was taught. The staff conferred regularly with the teachers concerning progress and problems in the materials and classroom management. Final production of all units was withheld until two or three weeks prior to usage in order to maintain flexibility and be responsive to the problems of the teachers. The instructional materials of the Chicago Reading Package are described in the next section. The package was evolved from the goals and concerns mentioned above,

as filtered through several months of trial and error in the classroom.

IV. The Chicago Mastery Reading Package

The instructional materials of the Chicago Mastery Reading Package consist of four elements: Skills Units, Comprehension Units, Enrichment Activities and Basal Readers. Brief descriptions of the four elements are presented below, followed by a discussion of how they are integrated to form the reading program.

A. The Skills and Comprehension Units -- These two elements comprise the basic fabric of the program into which the Enrichment and Readers are woven. Comprehension and Skills Units are based on different objectives, but the materials and teaching framework for the two are similar. Below is a description of the materials for these units along with discussion of how they are used.

1) Unit Overview: This explains to the teacher what objectives are being taught and what materials are contained in the unit.

2) Teachers Instructions: This is a teacher's guide for the teaching activities in the unit. The instructions include detailed suggestions for the basic instruction that occurs in the unit. There are also less detailed suggestions for other activities the teacher may want to engage in, depending on the class.

3) Practice Sheets for Students: These are worksheets for the students to practice the skills being developed. Included in these worksheets is practice in the format in which the pupils will later be tested.

4) Formative Tests: This is the assessment of skills mastered on the unit. The teacher receives acceptable mastery levels for each of the skills on the test.

5) Remedial Activities: These materials consist of teacher instructions and student worksheets for remediation of deficiencies. While it is recognized that an important cause of failure on the initial test is lack of attendance or attention, the remedial activities are based on the idea that a student attended to instruction and still could not master the skill. A procedure for retesting for mastery is contained in all remedial activities.

The Skills and Comprehension Units are based on the Chicago Board of Education's Curriculum Guide in Reading for the Elementary School (Chicago Board of Education, 1974). The guide contains a series of objectives which are categorized into strands (Word Attack, Study Skills, Comprehension and Literature) and placed into a hierarchy according to the grade levels at which they are taught.

Using this guide, the staff has culled objectives from the Word Attack and Study Skills strands and combined them into Skills Units. A Skills Unit typically contains two or

three word attack skills and one study skill (e.g. one unit contains skills related to prefixes, suffixes, and dictionary skills). From the guide's Comprehension strand objectives and from other sources, the Comprehension Units have been formed. A Comprehension Unit usually contains one skill that is concentrated on throughout the unit (e.g. one unit pertains to making comparisons).

B. Enrichment Activities -- During the time when remediation of deficiencies occurs, some pupils who master skills quickly are free to engage in other activities. The Enrichment Activities element is designed to provide materials for these pupils. Enrichment activities come from a variety of sources. Some are based on the guide's Study Skills strand objectives that are deemed less than essential to reading, some come from Literature strand objectives, and some are activities primarily for enjoyment.

C. Basal Reading -- The package is designed to work with any basal reading series. The readers are used independently of auxiliary series materials. The teacher may also select reading materials from other sources since the package is not tied into any particular stories. Teachers may select stories from readers that would complement activities from the Units, but this is not essential.

Since the Enrichment Activities described only take place in the context of remediation, there are basically three activities which can take place in the program. These are: reading

from a basal reader or other reading materials, working on a Comprehension Unit, or working on a Skills Unit. Reading instruction for a day is broken into two segments. The teacher can schedule any of the three activities to take place during a segment. The three activities run independently of each other. Reading instruction for a hypothetical week might look like this:

	M	T	W	T	F
1st Segment	S	S	S	S	C
2nd Segment	R	C	C	R	R

S = Skills Unit
C = Comprehension Unit
R = Reading

Figure 1

Skills Unit work occupies the first segment of reading instruction on Monday through Thursday in this week. This might represent initial instruction of a Skills Unit on Monday through Wednesday with the formative test being given on Thursday. By working on Comprehension and Reading on Friday, the teacher allows three days for grading papers and organizing remediation for the Skills Unit. Reading always comes in the second segment here, and it might be being used as motivation to do well in the first segment's instruction ("As soon as we complete this, we can finish yesterday's story."). Both segments may be devoted to a single unit or to reading if desired by the teacher. The teacher is free to organize the week in the most efficacious fashion.

Since the Skills and Comprehension Units are independent, a classroom may complete three Comprehension Units while only com-

pleting one Skills Unit. It is important to note before leaving this discussion of the package, that the Comprehension and Skills Units are both taught in Mastery Learning fashion even though progress in one is not dependent upon progress in the other. Further, whole class reading activities occur in a regularly scheduled fashion.

V. Preliminary Results

The goal of the first year of the Project was to work out the problems involved in implementing Mastery Learning in reading instruction in a large city school system. This section discusses the problems that have arisen and some solutions that have been found.

A. Teacher Training

The teachers received approximately 10 hours of instruction on Mastery Learning before they began to implement the program in their classrooms. Through discussion and informal questioning, the Project staff felt that the teachers had a sufficient background in the Mastery techniques at that time. Several problems arose however, and served as a warning to the staff that the implementation of Mastery Learning requires a significant change in teacher behavior.

The first problem was related to the use of the formative test. Several teachers had alotted substantial amounts of time for reviewing material before administering the test. This is clearly inefficient in a Mastery Learning framework. Furthermore, the teachers had considerable difficulty in adapting to the test as a formative instrument. The teachers were apologetic or defensive if the class did "poorly" on the first administration of the test, and conversely were quite proud if the class did "well" on the test. Only after several units and much discussion did the teachers begin to lose their anxiety about the formative test results.

The second problem was concerned with remediation. This problem was actually only partially related to teacher training; a major part of the problem was a conceptual one and will

be discussed later. It was difficult to get the teachers to do remedial work only with those pupils who demonstrated a need by their performance on the formative test. In many instances, if over half of the class needed remediation, the teacher would do the remedial work with all of the pupils. It was only after the staff made substantive changes in the format of remediation that the problem was ameliorated.

Finally, there is the general problem of teachers' anxieties with respect to innovation. There is an inherent implication in any educational innovation that the previous system was somehow "inferior". When that "previous system" is how the teacher currently teaches his class (conducts his profession), then some anxiety and defensiveness toward the innovation can be anticipated. This was a problem during the teacher training period and it impressed upon the staff that there are affective components to teacher training as well as cognitive ones.

In addition to the creation of instructional materials, classroom management procedures and teacher record keeping protocols were developed. While the problems of classroom management and record keeping may seem mundane to the educational researcher, they are critical to the classroom teacher. Practicable solutions to these problems are essential to any instructional program.

B. Classroom Management

Classroom management poses particularly difficult problems when remediation of deficiencies has to occur within the classroom setting. It was only through attempting several disastrous classroom management procedures that the staff and participating teachers arrived at some solutions for classroom management.

Our experience led us to the following conclusions concerning remediation activities in the classroom:

1. It is unreasonable to expect a teacher to be able to monitor more than three instructional activities at the same time (even if all the teacher is doing is monitoring). If the teacher is involved actively in an instructional activity, it is difficult for the teacher to successfully monitor more than one other group.

2. Many pupils failed to master skills because they were absent (either physically or mentally) when instruction

was initially given. Often these students merely need the instruction to be presented to them in order to reach mastery.

3. Pupils who fail to master after initial instruction often can be brought to mastery quite rapidly if their particular problems with a skill can be specifically identified.

4. Components of a task unrelated to the skill being taught can make the critical difference in student perseverance on a task until the skill is mastered. (e.g. If a student can cut cut cards, work with crayons, or play an instructional game, he may stay with the task longer.)

The procedure for remediation of skills that is currently being used consists of presenting the skill to the pupil in a programmed fashion. Whenever the pupil reaches a designated critical point, he calls upon the teacher or a pupil who has already mastered the skill to check his progress. If he is proceeding properly, he continues; if he is having difficulty, the instructor can remediate immediately. This procedure provides the teacher with information of a more diagnostic nature to guide the remediation. Additionally it allows pupils to quickly locate their particular problems without having to wait for pupils who have different difficulties with a skill. Two or three skills can be remediated in the classroom simultaneously. Those who reach mastery of the entire unit become progress checkers or work with Enrichment materials. The teacher works with the pupils who need help on a one-to-one basis. There is still some problem when several children need help at the same time. The problem, however is not presently serious and the staff is developing peer tutoring techniques to address this issue.

C. Record Keeping

In order to keep track of which students had and had not mastered the skills in a unit, matrices were constructed which crossed student names with skills in the unit. The staff originally felt that these charts should be kept confidentially by the teacher. The teachers, however, insisted on having large charts put up in the classroom. For each skill that was mastered by a pupil, an "x" was placed in the appropriate box under his name. If the pupil had not mastered the skill originally, when he successfully completed remediation he was permitted to place the "x" on the chart himself. The motivating influence of this procedure on the pupils was a pleasant surprise to the staff. Getting to put an "x" on the chart was viewed by the pupils as a challenge. Additionally, after several units, getting "all x's" on the initial formative test became a goal of the pupils.

At the time of this writing, the pupils in the Project have not been administered reading achievement tests, so their growth over the year cannot be assessed. In some respects, an evaluation of the progress of the pupils this year would be inappropriate because of the developmental nature of the year's activities. The purpose of this initial year's activities was to test and revise materials and procedures so that a Mastery Learning "treatment" could be defined and subsequently evaluated in an experimental setting. Some data have been gathered this year, however, and the preliminary returns are most encouraging. They are discussed below.

D. Results of the First Units

The first three units were constructed in a somewhat different fashion than the units described in Section IV, A. (There was no separation of Comprehension and Study Skills.) However, they were taught in a Mastery Learning framework and the results of the units are quite interesting. Table 1 contains the percentage of skills that were mastered on the initial formative test and the percentage of that were mastered after remediation for the five classes.

	Initial Testing	After Remediation
Unit 1 n=150	64.7%	97.6%
Unit 2 n=105*	64.4%	93.1%
Unit 3 n=138	79.5%	94.5%

Table 1.

* The n's vary partially because of the high transiency in the school. The n for unit 2 is particularly low because one of the teachers marked the "x's" for remediation on her chart with the same pen she used for initial mastery. It was impossible to differentiate. Such is life.

The results of Units 4 and 5 are not complete, but they show a similar pattern of approximately 95% of the skills eventually being mastered. Further, while the formative tests vary in difficulty there is a definite trend of increasing pupil performance in the initial testing. The reality of this apparent trend is confirmed by the teachers.

One of the basic tenets of Mastery Learning is that while aptitude measures are predictive of initial mastery on early units, they become less predictive in succeeding units. Table 2 is a correlation matrix of pupils' scores on the Iowa Test of Basic Skills sub-tests of Word Attack, Reading Comprehension (for the previous years), and the scores of the initial testing of units 1 - 3.

	Word Attack	Reading Comp.	Formative Test 1	Formative Test 2	Formative Test 3
Word Attack					
Reading Comprehension	.7503 p=.001				
Formative Test 1	.5359 p=.001	.4818 p=.001			
Formative Test 2	.3930 p=.001	.4244 p=.001	.5060 p=.001		
Formative Test 3	.2404 p=.004	.1109 p=.109	.2199 p=.007	.2403 p=.024	

Table 2.

It is apparent from even this limited set of data that the Iowa Test is growing less predictive of initial mastery.* (It is particularly interesting to look at the correlations of the Word Attack sub-test and the formative tests, since the formative tests were heavily weighted with word attack skills.)

While the data are not sufficient to draw any but the most tentative conclusions, it is nonetheless remarkable how well they fit the Mastery Learning model. Pupils' initial performance on the formative test is improving; pupils are successfully being brought to mastery when they show deficiencies; and pupils' performance is growing less dependent on initial aptitude.

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* It should be noted that the unit 3 test had a somewhat restricted variance due to a "ceiling effect" in the test.

Perhaps the most valuable information is being gathered informally. It has become increasingly apparent that both the teachers and the pupils are adapting to the Mastery Learning framework. The pupils approach the formative test as a normal part of instruction and another opportunity to get "all x's". The teachers are also becoming more comfortable with the testing and are getting more usage out of the test results. Record keeping has proven to be an asset instead of a liability and classroom management problems are working toward resolutions.

VI. The Outlook

At present the staff is working to refine classroom procedures and formats for materials so that the package can be revised, polished and made ready for a rigorous evaluation in a controlled setting. Our experiences this year have led us to believe that reading instruction can be adapted to the Mastery Learning framework and implemented in a large city school system. We are confident that a formal evaluation of the package will confirm our beliefs. Until we receive such confirmation we are heartened by comments such as the following from an initially reluctant teacher, "You can't have the leftover materials back, I need them for next year."

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